

IN THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claim 1 (canceled)

5.5 B1 >

Claim 2 (original): A document image processing device, comprising:
character region extracting unit extracting character regions respectively from a plurality of document images which are partitioned and read;
overlapping detecting unit detecting character regions whose matching degrees are high by making a comparison between positions and sizes of the respective character regions extracted by said character region extracting unit, and detecting an overlapping of the plurality of document images based on positions of the detected character regions whose matching degrees are high; and
image merging unit merging the plurality of document images at an overlapping position detected by said overlapping detecting unit.

Claim 3 (original): A document image processing device, comprising:
character region extracted unit extracting character regions respectively from a plurality of document images which are partitioned and read;

character recognizing unit recognizing character images within the character regions
extracted by said character region extracting unit;

61 overlapping detecting unit detecting an overlapping of the plurality of document images
based on character recognition results of the respective document images, which are obtained by
said character recognizing unit, and on a result of a comparison between positions and sizes of
the respective character regions in the plurality of document images, which are extracted by said
character region extracting unit; and

image merging unit merging the plurality of document images at an overlapping position
detected by said overlapping detecting unit.

Claim 4 (currently amended): The document image processing device
according to claim [[1]] 2,

wherein said character region extracting unit extracts a plurality of character regions in
line images in the plurality of document images.

Claim 5 (currently amended): The document image processing device
according to claim [[1]] 2,

wherein said overlapping detecting unit detects as an overlapping position of line images
whose matching degrees are high by making a comparison between character regions in line
images in a direction from edges of the plurality of document images to their centers.

Claim 6 (currently amended): The document image processing device according

to claim [[1]] 2,

wherein:

the plurality of document images which are partitioned and read are two document images;

and

6. said overlapping detecting unit detects an overlapping position of the two document images
by making a comparison between character regions in line images in the two document images.

Claim 7 (currently amended): The document image processing device according to claim
[[1]] 2,

wherein said overlapping detecting unit regards as detection targets character regions in
particular regions in the plurality of document images.

Claim 8 (currently amended) The document image processing device according to
claim [[1]] 2, wherein said overlapping detecting unit detects an overlapping position sequentially
from a direction with a higher priority among a plurality of detection directions.

Claim 9 (original): The document image processing device according to claim 8,
wherein said overlapping detecting unit determines an overlapping position detection
direction depending on whether or not the document images are written either vertically or
horizontally.

Claim 10 (currently amended): The document image processing device according to claim
[[1]] 2,
wherein said overlapping detecting unit detects an overlapping position only in a particular
direction.

Claim 11 (currently amended): The document image processing device according to claim
[[1]] 2,
wherein said character region extracting unit extracts a region enclosed by a tetragon
circumscribed to a character image as a character region.

Claim 12 (canceled)

Claim 13 (original): A document image merging method, comprising:
detecting a plurality of character regions whose matching degrees are high by making a
comparison between positions ^{and} an sizes of the respective character regions in the respective document
images;
detecting an overlapping of the plurality of document images based on positions of the
plurality of character regions whose matching degrees are high; and merging the plurality of
document images at a detected overlapping position.

Claim 14 (original): A document image merging method, comprising:
recognizing character images;

detecting an overlapping of the plurality of document images based on character recognition results of the respective document images, and on a result of a comparison between positions and sizes of the respective character regions in the plurality of document images; and
merging the plurality of document images at a detected overlapping position.

A. **Claim 15 (currently amended):** A document image processing device comprising:
region partitioning unit partitioning first and second ~~an arbitrary number of~~ document images among a plurality of document images which are partitioned and read, respectively ~~or the respective~~ document images into a plurality of vertical and horizontal regions;

line image extracting unit extracting line images containing only character images from the plurality of regions ~~respectively from the plurality of regions~~ partitioned by said region partitioning unit;

→ overlapping detecting unit detecting an overlapping position between the first and second ~~of the plurality of~~ document images, based on positions of character regions whose matching degrees are high by making a comparison between a character regions in the ~~of a~~ line image[[s]] in ~~[[the]]~~ a respective regions, containing a lot of line images, of a plurality of regions in the first document ~~extracted by said line image extracting unit and a character region of a line image in a corresponding region of the second document; and which are extracted by said line image extracting unit; and~~

image merging unit merging first and second ~~the plurality of~~ document images at the overlapping position detected by said overlapping detecting unit.

Claim 16 (currently amended): A document image processing device, comprising:

region partitioning unit partitioning ~~an arbitrary number of document images among a~~
~~plurality of~~ first and second document images which are partitioned and read, ~~or the respective~~
~~document images respectively~~ into a plurality of vertical and horizontal regions;

line image extracting unit extracting line images containing only character images from the
plurality of regions ~~respectively from the plurality of regions~~ partitioned by said region partitioning
unit;

character recognizing unit recognizing character images in the line images within the
respective regions, which are extracted by said line image extracting unit;

overlapping detecting unit detecting an overlapping position ~~of the plurality of~~ between the
first and second document images, based on a character recognition result of ~~one or~~ a plurality of
regions in the ~~respective first~~ document images, and a character recognition result of a ~~which are~~
~~obtained by said character recognizing unit; and~~ corresponding region in the second document;

image merging unit merging the first and second ~~plurality of~~ document images at ~~[[the]]~~ an
overlapping position detected by said overlapping detecting unit.

Claim 17 (currently amended): A document image processing device comprising:

region partitioning unit partitioning ~~an arbitrary number of document images among a~~
plurality of document images which are partitioned and read, ~~or the respective document images~~
respectively into a plurality of regions;

line image extracting unit extracting line images respectively from the plurality of regions
partitioned by said region partitioning unit;

overlapping detecting unit detecting a plurality of character regions whose matching degrees are high, by making a comparison between positions and sizes of a plurality of character regions in the line images extracted by said line image extracting unit, and detecting an overlapping position of the plurality of document images, based on the positions of the detected character regions; and

image merging unit merging the plurality of document images at the overlapping position detected by said overlapping detecting unit.

a.
Claim 18 (original): The document image processing device according to claim 15, wherein:

said region partitioning unit partitions the plurality of document images into a plurality of regions in a vertical and a horizontal direction; and

said line image extracting unit makes a comparison between the number of line images extracted from a region partitioned in the vertical direction in the plurality of document images and the number of line images extracted from a region partitioned in the horizontal direction, and recognizes a line image direction of a region including a larger number of line images as a line image direction of the plurality of document images.

Claim 19 (original): The document image processing device according to claim 15,

wherein said line image extracting unit detects pixels for one pixel line in a partitioned region, and detects pixel lines including a predetermined or larger number of black pixels as black pixel lines, and other lines as white pixel lines.

Claim 20 (original): The document image processing device according to claim 19, wherein said line image extracting unit detects pixels in the partitioned regions in line units in a direction vertical to a partitioning bar of the regions partitioned by said region partitioned unit.

G. **Claim 21 (original):** The document image processing device according to claim 19, wherein said line image extracts as a black pixel region a region where the number of successive black pixel lines is within a predetermined range.

Claim 22 (original): The document image processing device according to claim 21, wherein said line image extracting unit extracts as a white pixel region a region where the number of successive white pixel lines is equal to or larger than a predetermined value.

Claim 23 (original): The document image processing device according to claim 15,

wherein said region partitioning unit changes a partitioned region size depending on a resolution of a read document image.

Claim 24 (original): The document image processing device according to claim 21, wherein said line image extracting unit changes the number of black pixel lines regarded as black pixel regions depending on a resolution of a read document image.

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Claim 25 (original): The document image processing device according to claim 21, wherein said line image extracting unit extracts a black pixel region adjacent a white pixel region satisfying a predetermined condition as a line image.

Claim 26 (original): The document image processing device according to claim 18, wherein said overlapping detecting unit detects character regions whose matching degrees are high as an overlapping position by making a comparison between character regions in the line images in the plurality of partitioned region in the direction of the larger number of line images, which are extracted by said line image extracting unit.

Claim 27 (original): The document image processing device according to claim 15, wherein said overlapping detecting unit stores a detection frequency of a line image which was previously detected as an overlapping position of a document image in correspondence with identification information assigned to the line image, and detects an overlapping position by giving precedence to a line image with a high detection frequency.

Claim 28 (original): The document image processing device according to claim 15, wherein said overlapping detecting unit makes a comparison between the line images in the respective regions in a predetermined order.

Claim 29 (currently amended): A document image processing device, comprising:

region partitioning unit partitioning first and second ~~an arbitrary number of~~ document images among a plurality of document images which are partitioned and read, ~~or the respective document images~~ into a plurality of vertical and horizontal regions;

line image extracting unit extracting line images ~~respectively~~ containing only character images from the plurality of regions partitioned by said region partitioning unit;

01 overlapping detecting unit detecting an overlapping position ~~of the plurality of~~ between the first and second document images based on positions and sizes of character regions whose matching degrees are high by making a comparison between character regions of a line image in a region containing a lot of line images, of a plurality of regions in the first document in the line images in the respective regions, which are extracted by said line image extracting unit and a character region of a line image in a corresponding region of the second document;

image merging unit merging the ~~plurality of the first and second~~ document images at the overlapping position detected by said overlapping detecting unit; and

setting unit allowing a setting of whether or not to automatically merge the plurality of document images on a display screen.

Claim 30 (original): The document image processing device according to claim 29, wherein said setting unit is an operation button displayed on the display screen.

Claim 31 (original): The document image processing device according to claim 29, wherein said setting unit with which a user can set the number of merging sheets of document images.

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Claim 32 (currently amended): A document image merging method, comprising:

partitioning ~~an arbitrary number of~~ first and second document images from among a plurality of document images which are partitioned and read, ~~or the respective document images respectively~~ into a plurality of vertical and horizontal regions;

extracting line images containing only character images from the plurality of regions ~~respectively from the plurality of partitioned regions~~;

detecting an overlapping position between the first and second document images, of the plurality of document images based on positions of character regions whose matching degrees are high by making a comparison between a character region of a line image in a region containing a lot of line images, of a plurality of regions in the first document and a character region of a line image in a corresponding region of the second document ~~character regions in the line images in the respective regions~~; and

merging the ~~plurality of~~ the first and second document images at the detected overlapping position.

Claim 33 (currently amended): A document image merging method, comprising:

partitioning ~~an arbitrary number of~~ first and second document images among a plurality of document images which are partitioned and read, ~~or the respective document images respectively~~ into a plurality of vertical and horizontal regions;

extracting line images containing only character images from the plurality of regions ~~respectively from the plurality of partitioned regions~~;

recognizing character images in character regions within the extracted line images;

→ detecting an overlapping position between the first and second document images, of the plurality of document images based on character recognition results of the respective regions of a region containing a lot of line images, of the plurality of regions in the first document and a character recognition result of a corresponding region in the second document; and

Q merging the ~~plurality of the first and second~~ document images at the detected overlapping position.

Claim 34 (currently amended): A document image merging method, comprising:

partitioning ~~an arbitrary number of first and second~~ document images among a plurality of document images which are partitioned and read, ~~or the respective document images respectively~~ into a plurality of vertical and horizontal regions;

extracting line images containing only character images from the plurality of regions respectively from the plurality of partitioned regions;

detecting an overlapping position between the first and second of the plurality of document images based on positions of the extracted line image whose matching degrees are high by making a comparison between a character region of a line image in a region containing a lot of line images, of a plurality of regions in the first document and a character region of a line image in a corresponding region of the second document; and

merging the ~~plurality of the first and second~~ document images at the detected overlapping position.

Claim 35 (currently amended): A document image merging method, comprising:
making a display to allow a setting of whether or not to automatically merge a plurality of document images which are partitioned and read on a display screen;
partitioning ~~an arbitrary number of~~ first and second document images among the plurality of document images, ~~or the respective document images~~ respectfully into a plurality of vertical and horizontal regions;
extracting line images respectively containing only line character images from the plurality of regions from the plurality of partitioned regions;
recognizing character images in character regions within the extracted line images;
detecting an overlapping position of the ~~plurality of~~ first and second document images based on positions of character regions whose matching degrees are high by making a comparison between character region of a line image in a region containing a lot of line images, of a plurality of regions in the first document and a region of a line image in a corresponding region of the second document character regions in the line images in the respective regions; and merging the plurality of document images at the detected overlapping position.

Claim 36 (original): A computer-readable storage medium on which is recorded a program for causing a computer to execute a document image merging process, said process comprising:
extracting character regions respectively from a plurality of document images which are partitioned and read;

detecting character regions whose matching degrees are high by making a comparison between a plurality of character regions in the plurality of document images based on positions and sizes of the character regions, and detecting an overlapping position of the plurality of document images based on positions of the character regions whose matching degrees are high; and

merging the plurality of document images at the detected overlapping position.

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Claim 37 (original): A computer-readable storage medium on which is recorded a program for causing a computer to execute a document image merging process, said process comprising:

extracting character regions respectively from a plurality of document images which are partitioned and read;

recognizing character images within the extracted character regions;

detecting an overlapping position of the plurality of document images based on character recognition results of the respective document images and on a result of a comparison between positions and sizes of the plurality of character regions in the plurality of document images; and

merging the plurality of document images at the detected overlapping position.

Claim 38 (currently amended): A computer-readable storage medium on which is recorded a program for causing a computer to execute a document image merging process, said process comprising:

partitioning ~~an arbitrary number of~~ first and second document images among a plurality of document images which are partitioned and read, ~~or the respective document images~~ resepctively into a plurality of vertical and horizontal regions;

extracting line images containing only character images from the plurality of regions
~~respectively from the plurality of partitioned regions;~~

detecting an overlapping position between the first and second ~~of the plurality of~~ document
images based on positions of character regions whose matching degrees are high by making a
comparison between a character region of a line image in a region containing a lot of line images, of
a plurality of regions in the first document and a character region of a line image in a corresponding
region of the second document ~~regions in the line images within the respective regions; and~~

merging the ~~plurality of~~ the first and second document images at the detected overlapping
position.

Claim 39 (currently amended): A computer-readable storage medium on which is
recorded a program for causing a computer to execute a document image merging process, said
process comprising:

partitioning ~~an arbitrary number of~~ first and second document images among a plurality of
document images which are partitioned and read, ~~or the respective document images~~ reselectively
into a plurality of vertical and horizontal regions;

extracting line images containing only character images from the plurality of regions
~~respectively from the plurality of partitioned regions;~~

recognizing character images within character regions in the line images in the respective
regions;

detecting an overlapping position ~~of the plurality of~~ between the first and second document
images based on a character recognition result of a region containing a lot of line images, of the

plurality of regions in the first document and a character recognition result of a corresponding region in the second document ~~character recognition results of the respective regions; and~~

merging the ~~plurality of~~ first and second document images at the detected overlapping position.

6. **Claim 40 (currently amended):** A computer-readable storage medium on which is recorded a program for causing a computer to execute a document image merging process, said process comprising:

making a display to allow a setting of whether or not to automatically merge a plurality of document images which are partitioned and read on a display screen;

partitioning ~~an arbitrary number of~~ first and second document images among the plurality of document images, ~~or the respective document images~~ respectively into a plurality of vertical and horizontal regions;

extracting line images containing only characters images respectively from the plurality of partitioned regions;

recognizing character images in character regions within the extracted line images;

detecting an overlapping position between the first and second ~~of the plurality of~~ document images based on positions of character regions whose matching degrees are high by making a comparison between a character region of a line image in a region containing a lot of line images, of a plurality of regions in the first document and a character region of a line image in a corresponding region of the second document ~~character regions in the line images in the respective regions; and~~

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merging the ~~plurality~~ of the first and second document images at the detected overlapping position.

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Claim 41 (canceled)